

REMARKS

Claims 3-8, 33, 36 and 39 remain in the application for further prosecution. Since the previous amendment would only have been entered if an appeal were filed, the above amendments are based on the claims in the application prior to the Final Office Action of August 7, 2008. Claim 33 has been amended to clarify the invention relative to the cited references by including certain additions suggested by the Examiner in his Advisory Action of December 15, 2008. Claim 39 has been added.

Rejection Under 35 USC 103(a)

Claims 3, 5, 6, 33 and 36 were rejected as unpatentable (i.e. obvious) over Buechler (U.S. 6,133,855) in view of Hillman et al. (U.S. 4,756,884). The claims cover a microfluidic device and, as the Examiner points out, *"Apparatus claims must be structurally distinguishable from the prior art in terms of structure, not function."* Buechler teaches that, liquid is accelerated as it leaves a capillary and enters a wider region containing an array of posts. That is, the structure and its function are intertwined. The structure determines how liquid flows at a given rate through the device and the desired performance is not achieved unless the device is properly configured for the expected liquid flow.

The Examiner has pointed out the structural features Buechler's device has in common with that of the Applicants. However, he concedes that Buechler does not teach the use of a reagent deposited on an absorbent substrate. Therefore, Hillman was cited as supplying the use of reagent-containing substrate, arguing that locating the substrate where predictable results are achieved would be "obvious to try". The Applicants contend that, combining Hillman with Buechler is not obvious, but relies on hindsight in view of the invention as claimed.

The teachings of Hillman are ambiguous at best. Hillman does show a device in

his Fig. 1A that could be similar to those of Buechler and the Applicants, in that a capillary passageway supplies a wider area containing reagents. In discussing Fig. 1A, Hillman says the reagents are dried on the surface (column 18, lines 16-32). Hillman says nothing about structures in the wider region (20 in Fig. 1), so one must assume that liquid entering region 20 is free to fill the region as it will. It might trap air bubbles by traveling along the side walls and thus not contact all of the reagents on the surface. But, if a reagent-containing substrate were to be added to region 20 it should be evident that obtaining uniform contact with the substrate would be more difficult, since the substrate presents an obstacle that could hinder the flow of liquid. Furthermore, if the reagent-containing substrate is fibrous in nature, capillary forces would be created and they would also affect the flow of liquid.

Buechler improves contact with reagents disposed on the surface of his wide region by locating the reagents on the surface of posts, which limit the space available for liquid flow and raise the effective capillarity and the liquid velocity. If successful, as Buechler teaches it is, there is no reason to place the reagent on a substrate and separate the substrate from the posts. Nor would it be obvious to space the posts so as to lower the effective capillarity and reduce the liquid velocity, thereby obtaining uniform contact with the substrate. In other words, why would one skilled in the art make such changes to the Buechler design?

If one wanted to place their reagents on a substrate, it would seem that one would follow Buechler's lead by wrapping the substrate around posts to achieve the alleged advantage of increased liquid velocity. It should follow that the substrate would be uniformly contacted and such a design might be expected to achieve good results. However, if the substrate is *not* wrapped around the posts, it could be placed in various locations, with and without posts. But, the results would not be predictable and testing would be required. In the absence of the present

disclosure, one skilled in the art could not predict the results, that is, whether placing the reagent-containing substrate adjacent a set of posts disposed to both direct fluid flow and reduce the effective capillarity would provide good results. Not only would there be no motivation to do so, but such arrangements are no more than something to try.

The claimed microfluidic device is inherently more complex than the device at issue in the KSR case. In KSR, a single Jepson claim stated that it was an improvement to an adjustable accelerator pedal to place an electronic throttle connection on a fixed pivot. Since the advantage of avoiding movement of the throttle connection was considered obvious, the claim was determined to be invalid. Unfortunately, the court took the opportunity to expand the scope of obviousness, including the question of obvious to try. The court assumed where “*there are a finite number of identified, predictable solutions a person of ordinary skill in the art has a good reason to pursue the known options within his or her technical grasp*” (emphasis added). The court further relied on the “common sense” of one skilled in the art. However, these considerations may have applied to the KSR accelerator pedal, they lose their force when microfluidic technology is the subject.

An important question with respect to obvious to try is one of predictability. That is, if a group of possible solutions to a problem can be listed, it may not be evident that any of the potential solutions will be successful. The Applicant’s problem was how to distribute a liquid sample uniformly over a reagent-containing substrate in an enclosed space, while expelling air. Trapping air would prevent achieving the desired uniform response of the reagent. Using an array of posts in a manner contrary to Buechler should not be considered obvious to try and could not be predicted to be successful without experimental evaluation.

The Examiner notes that Hillman suggests that the reagents can be disposed on an

absorbent substrate. Hillman does not go further and does not discuss how such reagent-containing substrates would be deployed. Furthermore, Hillman does not suggest using posts or other structures to assist in distributing liquid samples. The Examiner must jump to the conclusion that it would be obvious to add the substrate of Hillman to the Buechler device, but without any reason other than quoting from the KSR opinion.

The Examiner has argued that the “wherein” clause in Claim 33 is not structure, but “*directed to intended use or a process step*”. The Applicants disagree. The posts are structures positioned to provide uniform contact of a sample with a reagent (or conditioning agent) – containing substrate. In practice, the actual disposition of the posts will be determined by several factors, including the dimensions of the well containing the posts and the location and attributes of the substrate. Thus, the structure is determined by its function. This distinction is illustrated in new Claim 39, in which the disposition of the posts is defined as means plus function. Such claim phrases are statutory and are interpreted as the means described in the specification and their equivalents.

The Examiner appears to infer that any combination of references may be made without providing a motivation to do so. However, the Examiner should make clear his reasons for concluding that Hillman would have led one of ordinary skill in the art to place a reagent (or conditioning agent) – containing substrate adjacent the array of posts used by Beuchler so that uniform contact of a sample with the substrate is achieved. The discussion above provides reasons why one skilled in the art would not have made such a combination.

Dependent claims 3-8 and 36 should be allowable if, as the Applicants contend, independent Claim 33 is patentable over Buechler in view of Hillman.

Claim 3 adds a second column of posts which, as the Examiner notes, is shown by

Buechler. However, such a configuration is not relied on for patentability, rather it is a preferred embodiment.

Claim 5, 6, and 36 cover alternatives in which the location of the absorbent substrate is specified. As previously discussed, the location of an absorbent substrate is not obvious unless one considers “obvious to try” to render any and all location to be obvious. However, predictability is not available in the development of microfluidic devices.

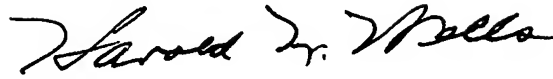
Claim 4 was rejected under 35 USC 103(a) as unpatentable over Buechler and Hillman, in view of Peters. Again, the Examiner relied on KSR to support his rejection. While Claim 4 is only dependent from Claim 33 and should be patentable, it has been previously pointed out that Peters taught the use of posts with wedge-shaped cutout in a different manner than they are used in the Applicant’s design. Peters empties capillaries with his cutouts, while in the Applicant’s inventions the cutouts are positioned 90 degrees from the direction of liquid flow.

Claims 7 and 8 were rejected under 35 USC 103(a) as unpatentable over Buechler and Hillman in view of Columbus, who is cited for teaching ramp structures, again relying on KSR. Claims 7 and 8 are dependent from Claim 33 and also should be allowable. As has been pointed out previously, Columbus uses opposed set of grooves to spread liquid in all directions. The Applicants spread liquid across the entrance to the reagent-containing well, which is structurally and functionally different.

The Examiner is urged to allow the newly amended claims. If further amendments are believed necessary, the Examiner is invited to contact the Applicant’s attorney at the telephone number provided below.

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Respectfully submitted,

A handwritten signature in black ink, appearing to read "Harold N. Wells". The signature is fluid and cursive, with the first name "Harold" being more prominent than the last name "Wells".

Harold N. Wells

Registration No. 26,044

Date:

Kelley Drye & Warren LLP

333 West Wacker Drive

Suite 2600

Chicago, Illinois 60606-3913

Telephone: 312/857-2336